

## CLAIMS

What is claimed is:

- 5           1.     A tire pressure monitor and information communicator for use in the operation of an automotive vehicle to relay information to the vehicle operator about the internal tire air pressure inflation level of each tire mounted on individual wheels on each axle of the vehicle, comprising:
  - 10               at least one rotating magnetic actuator in communication with the internal tire air pressure of a tire on the vehicle, said magnetic actuator being mounted through the wheel to provide access for the magnetic actuator to the internal tire air pressure, said mounting being made through the wheel in a location selected from the group consisting of the wheel rim, the wheel valve, the wheel side, the wheel valve stem, and the tire itself;
  - 15               an air pressure transducer within the at least one rotating magnetic actuator mounted through the wheel in a parallel relationship with the axle so that the transducer is speed-insensitive and reliable at any speed, said air pressure transducer for generating a signal proportional to the internal tire air pressure by transforming an input signal of said internal tire air pressure of from about 1.0 psi to about 100 psi to a detectable output signal for communicating tire pressure information to the vehicle operator;
  - 20               at least one stationary field sensor permanently mounted in a face-to-face relationship with the rotating magnetic actuator, said sensor being permanently mounted on a stationary portion of the vehicle, facing the rotating magnetic actuator as it rotates around at a physical distance gap between the rotating magnetic actuator and the field sensor of from about 0.01mm to about 50mm, whereby the field sensor detects the signal generated
  - 25               by the rotating magnetic actuator each time it rotates past the field sensor as the wheel makes a revolution; and
  - 30               a signal emitter for communicating information, said signal emitter being in communication with the stationary field sensor to communicate the signal information to the vehicle operator for relaying tire air pressure information whenever the tire pressure goes outside of a predetermined safe level for operating the vehicle.
2.     The tire pressure monitor of claim 1, wherein the at least one rotating magnetic actuator utilizes at least one magnet selected from the group consisting of permanent ferromagnets, permanent rare earth supermagnets, electromagnets, rechargeably

powered electromagnets, electromagnets powered by a capacitor, electronically controlled electromagnets, combinations of electromagnets for operations and recharging if needed and combinations thereof.

5           3.     The tire pressure monitor of claim 1, wherein the air pressure transducer of the magnetic actuator is a mechanically sensitive device including an elastic member retaining a piston adhered to a magnet, and the spring-piston combination attached to a diaphragm that is exposed to the tire air pressure, wherein the elastic member is selected from a group consisting of a helical spring, a compression spring, an expansion spring, a  
10 rubber plug, an elastomeric material, and an elastic bar of material having a suitable durameter strength to support the diaphragm.

          4.     The tire pressure monitor of claim 1, wherein the air pressure transducer of the magnetic actuator is an electronic component including a power source, a  
15 pressure transducer and an electromagnet coil adapted for generating an output voltage proportional to the tire air pressure to which it is being subjected.

          5.     The tire pressure monitor of claim 1, wherein the magnetic actuator includes a magnet that generates a magnetic flux density of from about 1 mks to about 10  
20 million mks with a magnet exhibiting from about 0.001 to about 50 tesla.

          6.     The tire pressure monitor of claim 1, wherein the at least one stationary field sensor is selected from the group consisting of a Hall effect sensor, a piezoelectric sensor, an electronic sensor, a proximity sensor, a field effect induction sensor, a strain  
25 gauge, a magnetically operated sensor, and combinations thereof.

          7.     The tire pressure monitor of claim 1, wherein the at least one stationary field sensor includes additional circuitry to produce a back voltage to recharge a battery in the rotating magnetic actuator.  
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          8.     The tire pressure monitor of claim 1, wherein the magnet incorporated into the air pressure transducer of the magnetic actuator needs to only move from about 5 mm to about 15 mm away from the stationary sensor in order to cut off the signal, thereby triggering the transfer of that information to the vehicle operator.  
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9. The tire pressure monitor of claim 1, wherein the stationary field sensor further comprises an amplifier in order to increase the signal being emitted.

10. The tire pressure monitor of claim 1, wherein the stationary field sensor includes a smart sensor that causes different information signals to be communicated to the vehicle operator by the signal emitter.

11. The tire pressure monitor of claim 1, wherein the signal emitter emits a signal every revolution of the wheel, said signal being proportional to the tire air pressure.

12. The tire pressure monitor of claim 1, wherein the signal emitter emits a danger signal when the tire pressure is less than from about 0.1 psi to about 5 psi above the lowest acceptable tire pressure for the vehicle.

13. The tire pressure monitor of claim 1, wherein the signal emitter emits a danger signal when the tire pressure is less than from about 1 psi to about 2 psi above the lowest acceptable tire pressure for the vehicle.

14. The tire pressure monitor of claim 1, wherein the signal emitter emits a signal by being hardwired into the onboard computer of the vehicle, and then the computer relays the information in any form and format that is predetermined for the application.

15. The tire pressure monitor of claim 2, wherein the signal emitter communicates to the vehicle operator by a method selected from the group consisting of a dashboard lighted display, a holographic windshield display, an electronic warning sound system, an LCD rear view mirror legend, and combinations thereof.

16. A tire pressure monitor and information communicator for use in the operation of an automotive vehicle to relay information to the vehicle operator about the internal tire air pressure inflation level of each tire mounted on individual wheels on each axle of the vehicle, comprising:

a rotating magnetic actuator in constant communication with the internal tire air pressure of a tire on the vehicle, said magnetic actuator being mounted through the wheel to provide access for the actuator to the internal tire air pressure, said

mounting being made through the wheel in a location selected from the group consisting of the wheel rim, the wheel valve, the wheel side, and the wheel valve stem;

an air pressure transducer within the rotating magnetic actuator which generates a magnetic flux density proportional to the internal tire air pressure by converting  
5 an input signal of said internal tire air pressure of from about 1.0 psi to about 100 psi to an output signal of from about 1 mks to about 10 million mks of magnetic flux density;

a stationary magnetic field sensor permanently mounted on the vehicle at a physical gap of from about 0.01 mm to about 50 mm from the rotating magnetic actuator as the wheel to which it is attached revolves around the axle of the vehicle during operation,  
10 whereby the magnetic field sensor detects the magnetic flux density generated by the rotating magnetic actuator each time it makes a revolution with the wheel; and

a signal emitter in electrical communication with the stationary magnetic field sensor that emits a signal to communicate information to the vehicle operator for relaying low tire air pressure information once the tire pressure drops to a level of less  
15 than from about 1 to about 5 psi more than a safe tire air pressure for operating the vehicle.

17. A method of using the tire pressure monitor of claim 1, comprising the steps of:

mounting at least one magnetic actuator through the wheel of the  
20 vehicle to communicate with the internal tire air pressure, so that the magnet of the at least one actuator faces the center of the vehicle, and so that the active part of the magnetic actuator is in a substantially parallel relationship to the axle of the wheel to minimize speed sensitivity;

permanently attaching at least one stationary field sensor onto the  
25 vehicle, whereby the field sensor is in a face-to-face relationship with the at least one magnetic actuator, having a physical distance gap between the actuator and the sensor of between about 0.01 mm to about 50 mm, so that the field sensor can be located within the flux lines of the magnetic field of the magnetic actuator, whereby a signal may be generated; and

30 communicating a signal that is proportional to the internal tire air pressure to the vehicle operator regarding the safe operation of the vehicle.